APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,166	03/10/2004	Holger Claussen	3-12	4036

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Docket Administrator (Room 3J-219)
Lucent Technologies Inc.
101 Crawfords Corner Road
Holmdel, NJ 07733-3030

EXAMINER
TORRES, JUAN A

ART UNIT	PAPER NUMBER
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/797,166	CLAUSSEN ET AL.
	Examiner	Art Unit	
	Juan A. Torres	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>10 March 2004</u>.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-18</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-18</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>16 June 2004</u> is/are: a)☐ accepted or b)☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)
1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>03/10/2004</u>.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

The information disclosure statement (IDS) submitted on 03/10/2004 is in

compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure

statement is being considered by the examiner.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5)

because they do not include the following reference sign(s) mentioned in the

description: "$b_{k,0}^{(n)}$"; "$b_{k,1}^{(n)}$"; "$b_{k,2}^{(n)}$"; "$b_{k,3}^{(n)}$"; b1; b2; b3; and b4 (see page 5 lines 7-16).

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in

reply to the Office action to avoid abandonment of the application. Any amended

replacement drawing sheet should include all of the figures appearing on the immediate

prior version of the sheet, even if only one figure is being amended. The figure or figure

number of an amended drawing should not be labeled as "amended." If a drawing figure

is to be canceled, the appropriate figure must be removed from the replacement sheet,

and where necessary, the remaining figures must be renumbered and appropriate

changes made to the brief description of the several views of the drawings for

consistency. Additional replacement sheets may be necessary to show the renumbering

of the remaining figures. Each drawing sheet submitted after the filing date of an

application must be labeled in the top margin as either "Replacement Sheet" or "New

Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

the applicant will be notified and informed of any required corrective action in the next

Office action. The objection to the drawings will not be held in abeyance.

Specification

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

The abstract of the disclosure is objected to because:

a) The abstract is not limited to a single paragraph;

b) The abstract exceed 150 words in length

Correction is required. See MPEP § 608.01(b).

The disclosure is objected to because of the following informalities: the recitation in page 18 line 16 "infinity []" is improper, because is not properly constructed; it is suggested to be change to "infinity".

Appropriate correction is required.

Claim Objections

Claim 6 is objected to because of the following informalities:

Claim 6 depends form claim 4, claim 4 stated that the modulation is 16 QAM,

claim 6 stated that the modulation is 64 QAM. It is not clear how the modulation is at the

same time 16 QAM and 64 QAM.

It is suggested to changed the dependency of claim 6 to depend directly from

claim 1 in the same way that claim 4.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-4, 11-13 and 16 are rejected under 35 U.S.C. 102(b) as being

anticipated by Chen (US 20020181604 A1).

Regarding claim 1, Chen discloses at a transmitter grouping data into a first

sequence of bits and a second sequence of bits (abstract figures 1A and 1B paragraph

[0028]), modulating a signal with the bits of the first sequence so that the bits of the first

sequence have a first level of communication error protection provided by the

modulation and with the bits of the second sequence so that the bits of the second

sequence have a second level of communication error protection provided by the

modulation less than the first level of communication error protection (figures 1A and 1B

paragraph [0028]), and transmitting the signal (abstract figures 1A and 1B paragraph

[0028]); and at a receiver detecting estimates of the bits of the first sequence from the

signal, determining contributions to the signal corresponding to the estimates of the bits

of the first sequence (figures 4A and 4B blocks 404 and 402 paragraph [0033]),

cancelling the contributions from the signal so as to produce a modified signal (figures

4A and 4B block 412 paragraph [0035]), detecting estimates of the bits of the second

sequence from the modified signal (figures 4A and 4B blocks 410 and 408 paragraph

[0035]).

Regarding claim 2, Chen discloses claim 1, Chen also discloses at the

transmitter encoding each of the sequences of bits by including error check data into the

sequence of bits before modulation (paragraphs [0011], and [0024]-[0025]), and at the

receiver decoding the estimates of the bits of each sequence so as to retrieve the data

(figures 4A and 4B blocks 404, 402, 410 and 408 paragraph [0033]-[0035]).

Regarding claim 3, Chen discloses claim 2, Chen also discloses that the

sequences are encoded with different levels of further protection provided by error

check data (paragraphs [0011], and [0024]-[0025]).

Regarding claim 4, Chen discloses claim 2, Chen also discloses that the

modulation provides a 16 Quadrature Amplitude Modulation signal, and the bits of the

first sequence comprise the first two bits of a four bit binary data sequence, and the bits

of the second sequence comprise the other two bits of said binary data sequence

(paragraphs [005], [0012]-[0013] and [0044]).

Regarding claim 11, Chen discloses a transmitter comprising a selector operative

to group data into a first sequence of bits and a second sequence of bits (abstract

figures 1A and 1B paragraph [0028]), a modulator operative to modulating a signal with

the bits of the first sequence so that the bits of the first sequence have a first level of

communication error protection provided by the modulation and with the bits of the

second sequence so that the bits of the second sequence have a second level of

communication error protection provided by the modulation less than the first level of

communication error protection (figures 1A and 1B paragraph [0028]), and a

transmitting stage operative to transmit the signal (figures 1A and 1B paragraph [0028]),

a receiver comprising a detector operative to detect estimates of the bits of the first

sequence from the signal (figures 4A and 4B blocks 404 and 402 paragraph [0033]), a

canceller operative to determine and cancel contributions to the signal corresponding to

the estimates of the bits of the first sequence from the signal so as to produce a

modified signal (figures 4A and 4B block 412 paragraph [0035]), a detector operative to

detect estimates of the bits of the second sequence from the modified signal (figures 4A

and 4B blocks 410 and 408 paragraph [0035]).

Regarding claim 12, Chen discloses claim 11, Chen also discloses a decoder

(figures 4A and 4B blocks 404, 402, 410 and 408 paragraph [0033]-[0035]).

Regarding claim 13, Chen discloses a selector operative to group data into a first

sequence of bits and a second sequence of bits (abstract figures 1A and 1B paragraph

[0028]), a modulator operative to modulating a signal with the bits of the first sequence

so that the bits of the first sequence have a first level of communication error protection

provided by the modulation and with the bits of the second sequence so that the bits of

the second sequence have a second level of communication error protection provided

by the modulation less than the first level of communication error protection (figures 1A

and 1B paragraph [0028]), and a transmitting stage operative to transmit the signal

(figures 1A and 1B paragraph [0028]).

Regarding claim 16, Chen discloses a receiver comprising a detector operative to

detect estimates of the bits of the first sequence from the signal (figures 4A and 4B

blocks 404 and 402 paragraph [0033]), a canceller operative to determine and cancel

contributions to the signal corresponding to the estimates of the bits of the first

sequence from the signal so as to produce a modified signal (figures 4A and 4B block

412 paragraph [0035]), a detector operative to detect estimates of the bits of the second

sequence from the modified signal (figures 4A and 4B blocks 410 and 408 paragraph

[0035]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Chen as applied to claim 1 above, and further in view of Ishio (US 4039961 A).

Regarding claim 5, Chen discloses claim 1, Chen also discloses that the principle

of the invention may be extended to additional layers of modulation (paragraphs [0011]

and [0041]). Chen doesn't specifically disclose that at the transmitter the grouping of the

data also provides a third sequence of bits, the bits of the third sequence also being

used to modulate the signal so that the bits of the third sequence have a third level of

communication error protection less than the second level of communication error protection, and at the receiver also determining and cancelling contributions to the signal corresponding to the estimates of the bits of the second sequence from the modified signal so as to produce a further modified signal and detecting estimates of the bits of the third sequence from the further modified signal. Ishio discloses that at the transmitter the grouping of the data also provides a third sequence of bits, the bits of the third sequence also being used to modulate the signal so that the bits of the third sequence have a third level of communication error protection less than the second level of communication error protection, and at the receiver also determining and cancelling contributions to the signal corresponding to the estimates of the bits of the second sequence from the modified signal so as to produce a further modified signal and detecting estimates of the bits of the third sequence from the further modified signal (Figure 6 column 4 line 55 to column 6 line 10). Chen and Ishio are analogous art because they are from the same field of endeavor of layered modulation. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Chen the third layer modulation disclosed by Ishio. The suggestion/motivation for doing so would have been to improve the transmission performance (Ishio column 4 line 55 to column 6 line 10).

Regarding claim 6, Chen discloses claim 4, Chen also discloses that the principle of the invention may be extended to additional layers of modulation (paragraphs [0011] and [0041]). Chen doesn't specifically disclose a 64 Quadrature Amplitude Modulation signal, and the bits of the first sequence comprise the first two bits of a six bit 6 binary

data sequence, the bits of the second sequence comprise the second two bits of said

binary data sequence, and the bits of the third sequence comprise the last two bits of

said binary data sequence. Ishio discloses a 64 Quadrature Amplitude Modulation

signal, and the bits of the first sequence comprise the first two bits of a six bit 6 binary

data sequence, the bits of the second sequence comprise the second two bits of said

binary data sequence, and the bits of the third sequence comprise the last two bits of

said binary data sequence (Figure 6 column 4 line 55 to column 6 line 10). Chen and

Ishio are analogous art because they are from the same field of endeavor of layered

modulation. At the time of the invention, it would have been obvious to a person of

ordinary skill in the art to incorporate in the system disclosed by Chen the third layer

modulation disclosed by Ishio. The suggestion/motivation for doing so would have been

to improve the transmission performance (Ishio column 4 line 55 to column 6 line 10).

Claims 7-10, 14, 15, 17 and 18 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Chen as applied to claim 1 above, and further in view of Applicant

Admitted Prior Art (AAPA) (US 20050201478 A1).

Regarding claim 7, Chen discloses claim 1, Chen doesn't disclose a prior

probability (APP) detector. AAPA discloses a prior probability (APP) detector (page 1

lines 21-27). Chen and AAPA are analogous art because they are from the same field of

endeavor of layered modulation. At the time of the invention, it would have been

obvious to a person of ordinary skill in the art to incorporate in the system disclosed by

Chen the APP detector disclosed by AAPA. The suggestion/motivation for doing so

would have been to reduce high interference levels in MIMO receivers (AAPA page 1 lines 21-27).

Regarding claim 8, Chen discloses claim 1, Chen doesn't disclose a Multi-Stage Partial Parallel Interference Cancellation (MS-PPIC) detector. AAPA discloses a Multi-Stage Partial Parallel Interference Cancellation (MS-PPIC) detector (page 2 lines 1-9). Chen and AAPA are analogous art because they are from the same field of endeavor of layered modulation. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Chen the MS-PPIC detector disclosed by AAPA. The suggestion/motivation for doing so would have been to reduce the complexity of the receivers (AAPA page 2 lines 1-9).

Regarding claim 9, Chen discloses claim 1, Chen doesn't disclose a detector giving soft estimates of bits and a decoder giving estimates of the bits based on the soft estimates. AAPA discloses a detector giving soft estimates of bits and a decoder giving estimates of the bits based on the soft estimates (page 2 lines 10-24). Chen and AAPA are analogous art because they are from the same field of endeavor of layered modulation. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Chen the soft estimates detector disclosed by AAPA. The suggestion/motivation for doing so would have been to reduce high interference levels in MIMO receivers (AAPA page 1 lines 21-27).

Regarding claim 10, Chen discloses claim 1, Chen doesn't disclose a Multiple Input Multiple Output (MIMO) signal for transmission by a space-time processor at the transmitter. AAPA discloses a Multiple Input Multiple Output (MIMO) signal for

transmission by a space-time processor at the transmitter (page 1 line 9 to page 2 line 30). Chen and AAPA are analogous art because they are from the same field of endeavor of layered modulation. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Chen the MIMO receiver disclosed by AAPA. The suggestion/motivation for doing so would have been to increase the data rate (AAPA page 1 lines 9-20).

Regarding claims 14 and 17, Chen discloses claims 13 and 16, Chen doesn't disclose a base station. AAPA discloses a base station (page 1 lines 9-20, the CDMA and the UMTS inherently discloses a Mobile telecommunications System that uses a base station and a mobile terminal). Chen and AAPA are analogous art because they are from the same field of endeavor of layered modulation. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Chen the UMTS disclosed by AAPA. The suggestion/motivation for doing so would have been to increase the data rate (AAPA page 1 lines 9-20).

Regarding claims 15 and 18, Chen discloses claims 13 and 16, Chen doesn't disclose a mobile user terminal. AAPA discloses a mobile user terminal (page 1 lines 9-20, the CDMA and the UMTS inherently discloses a Mobile telecommunications System that uses a base station and a mobile terminal). Chen and AAPA are analogous art because they are from the same field of endeavor of layered modulation. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to incorporate in the system disclosed by Chen the UMTS disclosed by AAPA. The

suggestion/motivation for doing so would have been to increase the data rate (AAPA page 1 lines 9-20).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

a) Claussen ("A low complexity iterative receiver based on successive cancellation for MIMO," in Proc. Personal Wireless Communications Conf. PWC'2002, pp. 105-112) discloses a receiver a posteriori probability (APP) detector; a MIMO receiver that replaces the optimum but complex APP detector by successive interference cancellation (SIC) incorporating sub-optimal matched filter detection; and a proposed novel soft-output combining scheme with a much lower complexity;

b) Isaka ("On the iterative decoding of multilevel codes", IEEE Journal on Selected Areas in Communications, Volume 19, Issue 5, May 2001 Page(s): 935 – 943) discloses Iterative decoding of multilevel coded modulation; and

c) Ling (US 7106813 B1) discloses combined soft-decision based interference cancellation and decoding.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan A. Torres whose telephone number is 571-272-3119. The examiner can normally be reached on 8-6 M-F.
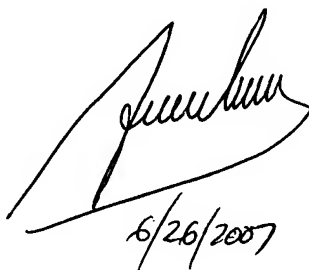
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone

number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Juan Alberto Torres
6-26-2007